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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/522,866	09/26/2005	Hong Ning Philip Cheang	7224P004	5240

8791 7590 08/20/2007  
BLAKELY SOKOLOFF TAYLOR & ZAFMAN  
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EXAMINER
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JOHNSON, KEVIN M

ART UNIT	PAPER NUMBER
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1709

MAIL DATE	DELIVERY MODE
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08/20/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/522,866

**Applicant(s)**

CHEANG ET AL.

**Examiner**

Kevin M. Johnson

**Art Unit**

1709

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 2/21/07.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☐ Claim(s) 1-3 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 January 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Status of Application*

1. Claims 1-3 are pending and are presented for examination.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Khor et al. ("Microstructure investigation of plasma sprayed HA/Ti6Al4V composites by TEM", 200, p 221-228) in view of Karthikeyan et al. ("Plasma spray synthesis of nanomaterial powders and deposits", 1997, p 275-286).

Khor teaches a method for producing hydroxyapatite (HA) materials with improved mechanical properties by the inclusion of a reinforcing material to form a composite. Zirconia and titanium are taught as good candidates for use as the reinforcing phase. Khor used a wet reaction method utilizing calcium hydroxide and

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orthophosphoric acid to produce the HA raw material, which was then dried and used in a powder plasma spraying process to produce composite HA/titanium (Ti6Al4V) materials.

The process taught by Khor differs from the claimed production method because the HA solution is dried before being subjected to the plasma spraying process and Ti6Al4V is used as a reinforcing phase.

It would be obvious to one skilled in the art at the time of the invention to add a zirconia suspension to the HA suspension instead of Ti6Al4V as the reinforcing phase due to its disclosure by Khor as a good candidate.

Karthikeyan further teaches a process for producing nanocomposite powders through the plasma spraying of liquid precursor solutions. A zirconia powder was produced through this method with particle sizes in the range of 20-80 nm utilizing a liquid feedstock solution.

It would be obvious to one skilled in the art to combine the method taught by Khor of producing a liquid HA solution from orthophosphoric acid and calcium hydroxide with the liquid precursor plasma spraying process taught by Karthikeyan.

One would have been motivated to modify the Khor process to eliminate the need to produce an HA powder for use in the plasma spraying step, simplifying the production process.

5. Claims 2 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Khor in view of Karthikeyan as applied to claim 1 above, and further in view of Khor et

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al. ("The effects of  $ZrO_2$  on the phase compositions of plasma sprayed HA/YSZ composite coatings", 2000, p 160-166).

The teachings of Khor in view of Karthikeyan has been mentioned above in the 103 rejection,

However, they are silent about the composition of the nano-composite powder containing 60-90% HA, 10-40 wt.%  $ZrO_2$ , and traces of calcium phosphate.

Khor further teaches plasma spraying precursor solutions of HA including 10 and 30 wt.%  $ZrO_2$ , and that composite powders of consisting of 90 wt.% HA and 10 wt.%  $ZrO_2$  and 70 wt.% HA and 30 wt.%  $ZrO_2$  can be produced, and it would be obvious to one skilled in the art that trace amounts of calcium phosphate would exist in the composite.

One would have been motivated to make such modification in the routine experimental pursuit of improved material performance.

### ***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Johnson whose telephone number is 571-270-3584. The examiner can normally be reached on Monday-Friday 7:30 AM to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on 571-272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KMJ



VICKIE Y. KIM  
SUPERVISORY PATENT EXAMINER